

WHAT IS CLAIMED IS:

1. A UV-assisted advanced-ozonation water treatment system comprising:

a water treating tank having a water inlet connected to a water supply line for supplying water to be treated;
an ozonic water tank for producing ozonic water;
an ozonized gas generator for supplying an ozonized gas into the ozonic water tank;

a UV light source disposed in the water treating tank and having a UV-radiating surface; and

an ozonic water jetting device for jetting the ozonic water supplied from the ozonic water tank onto the UV-radiating surface of the UV light source.

2. The UV-assisted advanced-ozonation water treatment system according to claim 1, wherein

the ozonic water jetting device includes jetting nozzles, and the ozonic water supplied from the ozonic water tank is jetted through the jetting nozzles onto the UV-radiating surface.

3. The UV-assisted advanced-ozonation water treatment system according to claim 1, wherein

a water supply pipe having an open bottom is disposed in the water treating tank, the water to be treated is supplied into the water supply pipe through an upper part thereof, and the UV light source and the ozonic water jetting device are disposed in the water supply pipe.

4. The UV-assisted advanced-ozonation water treatment system according to claim 1, wherein

an ozonized gas diffusing device is disposed in a lower part of the water treating tank, residual ozonized gas not dissolved in water and accumulated in an upper part of the ozonic water tank is supplied into the ozonized gas diffusing device and is diffused into the water treating tank.

5. A UV-assisted advanced-ozonation water treatment system comprising:

a water treating tank having a water inlet connected

to a water supply line for supplying water to be treated;
an ozonic water tank for producing ozonic water;
an ozonized gas generator for supplying an ozonized gas
into the ozonic water tank; and

advanced-ozonation modules disposed in the water treating tank, each including a cylindrical jacket with a side wall defining a substantially straight passage extending upward from a lower part of the water treating tank, a UV light source disposed in the cylindrical jacket and having a UV-radiating surface, and an ozonic water jetting device penetrating the side wall of the cylindrical jacket;

wherein ozonic water is supplied from the ozonic water tank into the ozonic water jetting devices, and the ozonic water jetting devices jet the ozonic water onto the UV-radiating surfaces of the UV light sources.

6. The UV-assisted advanced-ozonation water treatment system according to claim 5, wherein

interior of the water treating tank is divided into an ozonization chamber and an advanced-ozonation chamber by a partition plate, the water to be treated is supplied into an upper part of the ozonization chamber, an ozonized gas diffusing device is disposed in a lower part of the ozonizing chamber, the advanced-ozonation modules are disposed in the advanced-ozonation chamber, the residual ozonized gas not dissolved in water and accumulated in an upper part of the ozonic water tank or the ozonized gas remaining in an upper part of the advanced-ozonation chamber, or both are supplied into the ozonized gas diffusing device to diffuse the ozonized gas into the ozonizing chamber.

7. The UV-assisted advanced-ozonation water treatment system according to claim 5, wherein

the water treating tank is formed by connecting an ozonizing tank and an advanced-ozonation tank by a connecting pipe, the water to be treated is supplied into an upper part of the ozonization tank, an ozonized gas diffusing device is disposed in a lower part of the ozonizing tank, the

advanced-ozonation modules are disposed in the advanced-ozonation tank, the residual ozonized gas not dissolved in water and accumulated in an upper part of the ozonic water tank or the ozonized gas accumulated in an upper part of the advanced-ozonation tank, or both are supplied into the ozonized gas diffusing device to diffuse the ozonized gas into the ozonizing tank.

8. The UV-assisted advanced-ozonation water treatment system according to claim 7, wherein

the advanced-ozonation tank includes a plurality of advanced-ozonation tanks, the advanced-ozonation modules are disposed in each of the advanced-ozonation tanks, the plurality of advanced-ozonation tanks are connected to the ozonizing tank by connecting pipes, respectively, and the connecting pipes are provided with shutoff valves, respectively.

9. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5, wherein

a hydrogen peroxide injecting device is connected to the water supply line connected to the water inlet of the water treating tank.

10. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

a flow meter placed in the water supply line connected to the water inlet of the water treating tank; and

an arithmetic unit that controls flow rate of the ozonic water flowing from the ozonic water tank into the ozonic water jetting device, and intensity of UV light radiated by the UV light sources according to a difference between a reference flow rate and a measured flow rate measured by the flow meter.

11. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

a UV transmittance measuring means connected to the water supply line connected to the water inlet to measure UV transmittance of the water to be treated; and

an arithmetic unit that controls flow rate of the ozonic

water flowing from the ozonic water tank into the ozonic water jetting device or ozone concentration of the ozonized gas generated from the ozonized gas generator, or both, and the intensity of ultraviolet radiation radiated by the UV light source, according to difference between a reference UV transmittance and a measured UV transmittance measured by the UV transmittance measuring means.

12. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

an water quality measuring means placed in the water supply line connected to the water inlet to measure quality of the water to be treated; and

an arithmetic unit that controls flow rate of the ozonic water flowing from the ozonic water tank into the ozonic water jetting device or ozone concentration of the ozonized gas generated by the ozonized gas generator, or both, and intensity of UV radiation radiated by the UV light source according to difference between a reference water quality and a measure water quality measured by the impure water quality measuring means.

13. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

a clean water quality measuring means placed in a clean water carrying line connected to a water outlet of the water treating tank to measure quality of purified clean water; and

an arithmetic unit that controls flow rate of the ozonic water flowing from the ozonic water tank into the ozonic water jetting device or ozone concentration of the ozonized gas generated by the ozonized gas generator, or both, and intensity of UV radiation radiated by the UV light source according to difference between a reference water quality and a measure clean water quality measured by the clean water quality measuring means.

14. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

a flow meter placed in the water supply line connected to the water inlet of the water treating tank;

a UV transmittance measuring means placed in the water supply line connected to the water inlet of the water treating tank;

a clean water quality measuring means for measuring quality of purified clean water placed in a clean water carrying line connected to a water outlet of the water treating tank; and

an arithmetic unit that controls intensity of UV radiation radiated by the UV light source according to difference between a reference flow rate and a measured flow rate measured by the flow meter and difference between a reference UV transmittance and a measured UV transmittance measured by the UV transmission measuring device, and controls flow rate of the ozonic water flowing from the ozonic water tank into the ozonic water jetting device or ozone concentration of the ozonized gas generated by the ozonized gas generator, or both according to the difference between a reference clean water quality and a measured clean water quality measured by the clean water quality measuring means.

15. The UV-assisted advanced-ozonation water treatment system according to claim 1 or 5 further comprising:

a dissolved-ozone concentration meter placed in the water treating tank; and

an arithmetic unit that controls flow rate of the ozonic water flowing from the ozonic water tank into the ozonic water jetting device or ozone concentration of the ozonized gas generated by the ozonized gas generator, or both according to difference between a reference dissolved-ozone concentration and a measured dissolved-ozone concentration measured by the dissolved-ozone concentration meter, and adjusts the intensity of UV radiation radiated by the UV light source to a predetermined value.

16. The UV-assisted advanced-ozonation water treatment system according to claim 9 further comprising:

a bromide ion concentration measuring means for directly or indirectly measuring bromide ion concentration placed in the impure water supply line on an upper side of the hydrogen peroxide injecting device; and

an arithmetic unit that increases hydrogen peroxide injecting rate and reduces intensity of UV radiation radiated by the UV light sources according difference between a reference bromide concentration and a measured bromide ion concentration measured by the bromide ion concentration measuring means when the measured bromide ion concentration rises beyond the reference bromide ion concentration, and reduces hydrogen peroxide injecting rate and increases intensity of UV radiation radiated by the UV light sources according to difference between a reference bromide ion concentration and a measured bromide ion concentration when the measured bromide ion concentration drops below the reference bromide ion concentration.

17. An advanced-ozonation module comprising:

a cylindrical jacket defining a substantially straight passage;

a UV light source having a UV-radiating wall having a UV-radiating surface; and

an ozonic water jetting device including jetting nozzles penetrating a side wall of the cylindrical jacket.